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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/664,781	09/16/2003	Christophe Maleville	4717-6100	4844
28765	7590	08/08/2005	EXAMINER	
WINSTON & STRAWN LLP			CARRILLO, BIBI SHARIDAN	
1700 K STREET, N.W.			ART UNIT	
WASHINGTON, DC 20006			PAPER NUMBER	

1746

DATE MAILED: 08/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/664,781

Applicant(s)

MALEVILLE ET AL.

Examiner

Sharidan Carrillo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 11-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 11-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1, 16, and 25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 16, and 25 are indefinite because it is unclear how an adhesive surface is produced since an adhesive means a substance capable of bonding to other substances. The claims are directed to wet etching and dry oxidation, which result in the cleaning of the wafer surface. If applicant intends the term "adhesive" to mean a bondable surface that is dry and hydrophilic, then the claims should be amended to replace the term "adhesive" to include a "bondable surface".

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-2, 5, 11, and 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Hishiya et al. (US2004/0087180).

Hishiya et al. teach pretreating a silicon wafer by immersion in an HF solution

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followed by transferring the wafer within a closed container and treating a gaseous ozone atmosphere (Fig. 2-3, paragraphs 70, 118, 131-137). Paragraph 118 teaches that the oxidation can be performed using a dry oxidation method comprising ozone. In reference to claims 5 and 11, refer to paragraph 131. The limitations of an hydrophobic and hydrophilic surface are inherently met as a result of performing the same method steps as that of the instantly claimed invention.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

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not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hishiya et al. (US2004/0087180).

Hishiya et al. fail to teach the duration of wet chemical etching. However, it would have been within the level of the skilled artisan to modify the duration of the cleaning depending upon the amount and type of contaminants present on the wafer surface.

7. Claims 13-16, and 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hishiya et al. (US2004/0087180), as applied to claims 1-2, 5, 11, and 25 in paragraph 4 above, and further in view of Geusic et al. (6630713).

In reference to claims 13-16 and 21-22, Hishiya et al. fail to teach bonding the etched surface and annealing at a temperature of 500 degrees centigrade. Geusic teaches a method of bonding one semiconductor surface to a second semiconductor surface. In col. 4, lines 20-30, Geusic teaches it is convention to anneal surfaces at a temperature of at least about 500 degrees centigrade. In col. 5, lines 20-60, Geusic teaches etching the wafer surface with HF solution and further teaches bonding the wafer prior to annealing in order to retain cleanliness of wafer surfaces. It would have been obvious to a person of ordinary skill in the art to have modified the method of Hishiya et al. to include bonding and annealing since such steps, as taught by Geusic are conventional in the semiconductor manufacturing process. Additionally, applicant's

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own specification (page 6) teaches that the limitations of laying one wafer on top of another and applying pressure are conventional steps used in wafer bonding. In reference to bond strength, one of ordinary skill in the art would reasonably expect the annealing to increase the bond strength to between 0.28 to 0.38 since Geusic is performing annealing at the same temperature as that of the instantly claimed invention. In reference to claim 20, it would have been obvious to a skilled artisan to treat another substrate by wet etchings in order to remove contaminants from the substrate surface prior to bonding. In reference to claim 23, refer to the teachings of Hishiya et al.

8. Claims 1-5, 11-12, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu et al. (US2003/0087532) in view Hishiya et al. (US2004/0087180).

Wu et al. teach etching and oxidizing a semiconductor substrate. In reference to Claims 1 and 11 refer to paragraphs 13 and 44. The limitations of a hydrophobic surface and hydrophilic surface are inherently met as a result of performing the same method steps as that of the instantly claimed invention. In view of the indefiniteness of claim 1 with respect to the adhesive surface, the limitations are inherently met since Wu et al. are performing the same method steps as that of the claimed invention. In reference to claims 2-3, refer to paragraphs 12 and 37. In reference to claims 4-5 refer to paragraph 57. In reference to claims 12 refer to paragraphs 28 and 29.

In reference to claims 1, 11, and 25, Wu et al. fail to teach immersing the work piece in a closed container. Hishiya teach immersing a substrate with HF to remove oxide followed by oxidation with gaseous ozone. It would have been obvious and well

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within the level of the skilled artisan to modify the method of Wu et al. to include immersion, as taught by Hishiya as conventional means for cleaning the substrate surface.

9. Claims 13-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu et al. (US2003/0087532) in view Hishiya et al. (US2004/0087180), as applied to claims 1-5, 11-12, and 25 as described in paragraph 8 above, and further in view of Geusic et al. (6630713).

In reference to claims 13-16 and 21-22, Wu et al. in view of Hishiya et al. fail to teach bonding the etched surface and annealing at a temperature of 500 degrees centigrade. Geusic teaches a method of bonding one semiconductor surface to a second semiconductor surface. In col. 4, lines 20-30, Geusic teaches it is convention to anneal surfaces at a temperature of at least about 500 degrees centigrade. In col. 5, lines 20-60, Geusic teaches etching the wafer surface with HF solution and further teaches bonding the wafer prior to annealing in order to retain cleanliness of wafer surfaces. It would have been obvious to a person of ordinary skill in the art to have modified the method of Wu et al. to include bonding and annealing since such steps, as taught by Geusic are conventional in the semiconductor manufacturing process.

Additionally, applicant's own specification (page 6) teaches that the limitations of laying one wafer on top of another and applying pressure are conventional steps used in wafer bonding. In reference to bond strength, one of ordinary skill in the art would reasonably expect the annealing to increase the bond strength to between 0.28 to 0.38 since Geusic is performing annealing at the same temperature as that of the instantly claimed

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invention. In reference to claim 20, it would have been obvious to a skilled artisan to treat another substrate by wet etchings in order to remove contaminants from the substrate surface prior to bonding. In reference to claims 17 and 18-19 refer to paragraphs 37 and 57 of Wu et al. In reference to claim 20, it would have been obvious to a skilled artisan to treat another substrate by wet etchings in order to remove contaminants from the substrate surface prior to bonding. In reference to claim 23, refer to the teachings of Hishiya et al. In reference to claims 23-24, refer to paragraphs 28-29 of Wu et al.

Response to Arguments

10. The rejection of the claims under 112, second paragraph issues is maintained for the reasons set forth above.

11. Applicant argues that Wu fails to teach etching followed by treatment with gaseous ozone. Applicant is directed to Fig. 2, steps 28-30, paragraph 50 and Fig. 5, steps 44, 48. Applicant argues that Wu et al. teach an ozone solution but fails to teach an ozone gas. Applicant's arguments are unpersuasive because applicant is relying on preferred embodiments and not on the teachings of the reference as a whole..

12. Applicant argues that Wu fails to teach a subsequent bonding step, the limitations of which are taught by Geusic. Applicant further argues that Wu fail to teach exposing the etching surface to a gaseous ozone atmosphere within a closed container, the limitations of which are taught by Wu et al. in paragraphs 44, 53 and 54.

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13. Applicant argues that Wu fails to teach uniformly treating the surface. Applicant's arguments are unpersuasive because they are not commensurate with the instantly claimed invention.

14. Applicant argues that Wu fails to teach immersion. Although Wu is silent with respect to immersion, the step of treating a substrate by immersion is notoriously well known in the art as evidenced by Hishiya et al.

15. Applicant argues the combination of Wu in view of Kenny et al., citing Kenny teaches away from a dry surface. In view of applicant's arguments, the prior art of Hishiya has been introduced to cure the above deficiency.

16. Applicant's arguments directed to Geusic are unpersuasive since Geusic is relied upon to teach an annealing process, as admitted by applicant and not a closed container.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sharidan Carrillo whose telephone number is 571-272-1297. The examiner can normally be reached on M-W 6:30-4:00pm, alternating Thursday.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on 571-272-1414. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sharidan Carrillo
Primary Examiner
Art Unit 1746

bsc



SHARIDAN CARRILLO
PRIMARY EXAMINER